BE IT KNOWN, that **Ralph Burton Dalton and Tracey Mae Dalton** have invented a new and useful improvement in:

DEVICE FOR REMOVING STAINS

PROCOPIO, CORY, HARGREAVES & SAVITCH, LLP
530 B Street, Suite 2100
San Diego, California 92121

Express Mail Label No. EL 986 039 990 US
Date of Deposit; October 21, 2003

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Mail Stop Patent Application, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450

Karen M. Cruz

October 21, 2003
Date

DEVICE FOR REMOVING STAINS

FIELD OF THE INVENTION

[01] The present invention relates generally to cleaning devices for swimming pools and concrete, and in particular, to a device for cleaning rust spots, calcium deposits, etc. from swimming pool walls, concrete, and other surfaces.

BACKGROUND OF THE INVENTION

[02] In-ground swimming pools are sometimes formed of concrete, gunite or plaster (generally referred to herein as concrete). Algae stains, metal stains, and calcium scale often build up on the walls and tile of swimming pools. Some stains may be removed with a brush or rag, but persistent stains such as calcium scale are more difficult to remove. If the swimming pool becomes extremely stained, it is well known to drain and "acid wash" the entire pool. This typically includes scrubbing the pool walls with a diluted mixture of muriatic acid and water and sometimes the use of bleach. This, of course, is highly undesirable because tens of thousands of gallons of water are wasted by emptying the pool, and muriatic acid is dangerous to work with. In addition, in-ground swimming pools are structurally designed to be filled with water, and when they are emptied there is a danger that the hydrostatic pressure underneath the pool can cause the pool floor to crack.

[03] Accordingly, there is a long-felt need in the art for a cleaning device for concrete swimming pools, patios, paths, driveways, other concrete structures, and other surfaces that can effectively remove stains, and is easy to use and, in the case of cleaning a pool surface, avoids the necessity of draining the pool.

SUMMARY OF THE INVENTION

[04] Accordingly, one object of the present invention is to overcome the difficulties of the prior art.

[05] An aspect of the present invention is directed to a cleaning composition for cleaning concrete pools, other concrete surfaces, tile, and other surfaces. The composition includes an aggregate which is an abrasive that does the cleaning, and a binder that holds the aggregate together to be used in the cleaning process. The present invention achieves a balance between the performance of the aggregate and the binder in that the aggregate and the binder substantially uniformly break down in balance with each other so as to efficiently use the majority or preferably substantially all of each layer of aggregate before the binder releases it, and a new layer is presented. The aggregate must not be harder than the material to be cleaned (e.g. the pool wall) and preferably has the ability to fracture so as to continually expose new cutting or cleaning areas.

[06] Another aspect of the invention involves a method of cleaning calcium build-up on tile of a pool. The method includes providing a tile cleaner including a first type of cullet aggregate of a first size and a second type of cullet aggregate of a second size, and a binder for binding the first and second types of aggregate together; and scrubbing the calcium build-up and tile of the pool with the tile cleaner whereby the first and second type of cullet aggregate and the binder all wear at substantially the same rate and the calcium build-up is removed from the tile of the pool.

[07] A further aspect of the invention involves a method of cleaning calcium build-up on tile of a pool. The method includes providing a tile cleaner including cullet aggregate

and a polymer binder for binding the cullet aggregate together; scrubbing the calcium build-up and tile with the tile cleaner so that calcium build-up is removed from the tile of the pool; wearing down the cullet aggregate and the polymer binder at substantially the same rate; dropping spent cullet aggregate and polymer binder off the tile cleaner; and exposing a new layer of cullet aggregate and polymer binder as a new cleaning surface.

[08] A still further aspect of the invention involves a cleaning device for swimming pools including a first type of cullet aggregate which is friable and having particles of a first size; a second type of cullet aggregate which is friable and having particles of a second size, the size of the particles of the first type of aggregate is larger than size of the particles of the second type of aggregate and the second type of aggregate is nested within spaces between the first type of aggregate; a binder for binding the first and second types of cullet aggregate together, wherein upon the cleaning device being scrubbed against a surface, the first and second types of aggregate and the binder all wear at substantially the same rate.

[09] Other objects, advantages and features of the invention will become apparent to those of ordinary skill in the art upon reading the detailed description below.

BRIEF DESCRIPTION OF THE DRAWINGS

[10] FIG. 1 is a perspective view of the cleaning tool of the invention.

[11] FIG. 2 is a flow chart of the method of making the cleaning tool of the invention.

[12] FIG. 3 is a magnified view of the area within circle 3 of FIG. 1.

[13] FIG. 4 is an exploded view of a mold for making the cleaning tool of the invention.

[14] FIG. 5 is a side view of a second embodiment of the mold.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[15] The cleaning tool of the present invention is illustrated in FIG. 1. It includes a cleaning portion 1 and a handle 2 extending therefrom. Handle 2 is preferably provided with a snap clip 3 for engagement in a conventional manner with a swimming pool accessory extension pole 4.

[16] The cleaning tool is especially useful in removing surface blemishes from concrete or plaster pools and ceramic tile at the waterline of the pool. This includes cleaning the grout without scratching or gouging it. Such surface blemishes include rust stains, algae stains, metal stains, swimfin stains, etc. on the pool walls and calcium build-up on ceramic tile. The cleaning composition is formed of two different sized aggregates used as the cleaning or abrasive element of the device and a selected polymer, described more fully below, which tool posts or encases each aggregate particle. As shown in FIG. 3, two different sizes of aggregates are used so that smaller aggregates 6 nest within the spaces between larger aggregates 5. This results in a denser packed concentration of the aggregate which improves results.

[17] In developing the present invention, the inventor experimented with numerous types of binders (polymers) and aggregates. Each failed to achieve the superior and unexpected results of the present invention.

[18] Different types of aggregates that were experimented with include: crushed walnut shells, which tended to be too tough, crushed corn cobs which were too soft, and crushed peach pits which also were too soft. Silicon carbide was used, but it was too

hard and sharp, as was aluminum oxide. In addition, the inventor experimented by adding a powdered detergent to the aggregates, but that was deemed ineffective. Similarly, the inventor experimented by adding sawdust and cloth to the aggregates, but they too were deemed ineffective. Garnet was too sharp, tungsten carbide was too hard, and pumice was too soft.

[19] The use of silica sand as the aggregate achieved excellent results for providing the proper hardness and wearability for concrete.

[20] In addition, experiments were performed with numerous binders. These include a two-part polyurethane casting system having a shore A hardness of 50-60 sold by Hexcel Corporation of California. However, the inventor found that the more suitable binder to achieve the desired balance with the silica sand was a mold compound marketed by Smooth On Corporation located in Gillette, N.J. known as PMC-121 having a shore A hardness of 50. Although uncertain, the inventor believes that this product achieves superior results because of its elongation at break property of 500%. However, other properties, or combinations of properties of the binder may be the reason why the superior results are achieved. The Smooth On PMC-121 product has the following properties: a viscosity of 1,400 cps; a specific gravity of 1.04 g/cm^3; a specific volume of 26.7 cubic inches per pound; ultimate tensile strength of 350 PSI; a shore A hardness of 50; a compression set of 16.5%; a 100% modulus of 100 PSI; and a tear strength of 65 PLI.

[21] The materials selected for use in the present invention work in combination such that the binder which holds the aggregate material wears at substantially the same rate as the aggregate. Thus, as the aggregate wears down and loses its cleaning ability, the

binder also wears down until the spent aggregate and binder fall off the device. As a result, a new layer of aggregate and binder are exposed to, provide a new cleaning surface. As shown in FIG. 3, the use of two sized aggregates, silica sand #20 and silica sand #30, work together such that the smaller silica sand 6 nestles into the spaces between adjacent larger particles of silica sand 5. The sand is also surrounded by the polymer 7. Moreover, silica sand is friable and therefore continually presents new cutting or cleaning edges to be used in cleaning the pool wall. The above advantages are achieved, in one aspect of the invention, by the following composition.

[22] A composition of matter including the following elements in percentages by volume: 40% of a polymer having a 50 shore A hardness and an elongation at break of 500%, such as PMC 121/50 marketed by Smooth-On Corporation of Gillette, N.J., 5% MEK (methyl ethyl ketone), 271/2% silica sand no. 20 and 271/2% silica sand no. 30.

[23] FIG. 2 illustrates a method of making the cleaning tool of the invention. As Smooth-On PMC 121 is a two-part polymer, there is a part A and a part B which must be mixed together to form the product. Typically this is done in a pail with plastic spatula. In step 10, part A and part B are mixed at a 1:1 ratio for approximately 1 minute to constitute 40% of the entire volume to be made. Next, in step 20, MEK is added to the mix to constitute 5% of the volume of material to be made and the mix is continued to be mixed for another minute to two minutes. In step 30, 271/2% silica sand no. 20 and 271/2% silica sand no. 30 are added and the mixture is again mixed for a minute or two minutes. In step 40 the mixture is poured into a mold and allowed to set for 4-6 hours at room temperature. The mold is then released (step 50) and the product allowed to cure for an additional six or seven days (step 60).

[24] In an alternative preferred embodiment of the invention, the two different sizes of silica sand aggregate are replaced with two different sizes of a cullet aggregate and a reddish color pigment is used to give the composition a reddish color (the remaining aspects of the composition and method of manufacturing the same described above remain the same). Instead of silica sand #20 and silica sand #30, a 10x30 screen size cullet and a 20x60 screen size cullet are used, also in a 1:1 ratio. A cullet such as that sold by Universal Ground Cullet, Inc. of Brookpark, Ohio may be used. There are no free elements in the cullet. All the oxides are chemically combined in this inorganic product of the fusion that took place in the original melting process. There is no free silica in the cullet. A typical chemical analysis is as follows:

SiO_2	72.50%
Fe_2O_3	.20%
Al_2O_3	.16%
CaO	9.18%
MgO	3.65%
Na_2O	13.20%
SO_3	.39%
K_2O	.12%

Other Typical characteristics include:

1. Hardness 5.5 to 6.5 (MoH).
2. Specific gravity 2.50.
3. Bulk density 75 lbs per cu ft
4. Sharp angular yet irregular shapes
5. Inert to all chemicals except hydrofluoric, fluosilicic and phosphoric acids and hot, strong alkaline solutions.
6. High tensile and structural strength, semi-friable
7. Fracture – conchoidal, angular, irregular
8. Pathological effects – none, inert
9. Color – white or mixed
10. Transparency – translucent, opaque or transparent
11. Melting point – softening point 730C, liquid 1500C
12. Magnetism – none

13. Electrical conductivity – lowest of any common material. Less than 10 mho/cm. Considered to be dielectric.
14. Thermal conductivity – low
15. Continuous upper use temperature 120C
16. Noncombustible
17. Non-toxic
18. Lustre-vitreous

[25] FIG. 4 illustrates a mold 70 for use with the invention. As shown, the mold 70 has two parts 72 and 74 which join together when the composition is poured. Each part 72 and 74 have cut-outs 76 formed therein to form the shape of the molded tool. The top of each part of the mold 70 also has a semi-circle 80a or 80b formed therein such that when parts 72 and 74 are joined together semi-circles 80a and 80b form a full circle 82. The mold is then poured through the circle 82 and handle 2 is then inserted through the circle 82 into the mold. The mold is released by separating the two parts 72 and 74 of the mold 70.

[26] FIG. 5 shows an alternate embodiment of the mold 70' in which multiple molds are stacked upon each other.

[27] Having thereby described certain embodiments of the invention, it will be apparent to those skilled in the art that many modifications may be made within the scope of the invention. Therefore, the scope of the invention is only limited by the appended claims.

[28] For example, in certain embodiments of the invention, titanium dioxide may be added to the mix in a small amount to suitably color the final product.

[29] It will be readily apparent to those skilled in the art that still further changes and modifications in the actual concepts described herein can readily be made without departing from the spirit and scope of the invention as defined by the following claims.